

Study Guide

For use with pages 494–499

GOAL Use sine and cosine to find triangle side lengths.**VOCABULARY**

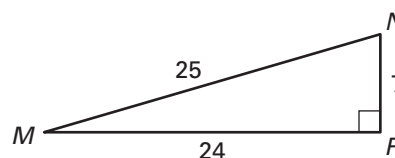
The **sine** of an acute angle of a right triangle is the ratio of the length of the side opposite the angle to the length of the hypotenuse.

The **cosine** of an acute angle of a right triangle is the ratio of the length of the angle's adjacent side to the length of the hypotenuse.

EXAMPLE 1 Finding Sine and Cosine RatiosFor $\triangle MNP$, find the sine and cosine of $\angle M$.**Solution**

$$\sin M = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{7}{25}$$

$$\cos M = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{24}{25}$$

**Exercise for Example 1**

1. For $\triangle MNP$, find the sine and cosine of $\angle N$.

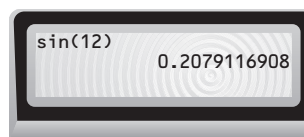
EXAMPLE 2 Using a Calculator

- a. $\sin 12^\circ$

Keystrokes

2nd [TRIG] = 12) =

Answer: $\sin 12^\circ \approx 0.2079$

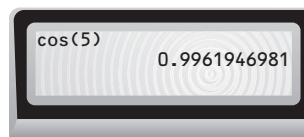
Display

- b. $\cos 5^\circ$

Keystrokes

2nd [TRIG] ► ► = 5) =

Answer: $\cos 5^\circ \approx 0.9962$

Display**Exercises for Example 2**

Use a calculator to approximate the sine or cosine value to four decimal places.

2. $\sin 17^\circ$ 3. $\sin 67^\circ$ 4. $\cos 35^\circ$ 5. $\cos 85^\circ$

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EXAMPLE 3 Using a Cosine Ratio

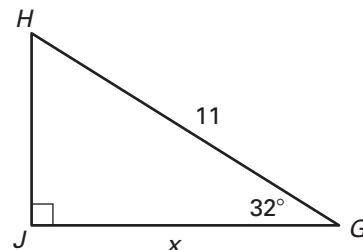
In $\triangle GHJ$ shown, \overline{GJ} is adjacent to $\angle G$. You know the length of the hypotenuse. To find the value of x , use $\cos G$.

$$\cos G^\circ = \frac{\text{adjacent}}{\text{hypotenuse}} \quad \text{Definition of cosine ratio}$$

$$\cos 32^\circ = \frac{x}{11} \quad \text{Substitute.}$$

$$0.8480 \approx \frac{x}{11} \quad \text{Use a calculator to approximate } \cos 32^\circ.$$

$$9.328 \approx x \quad \text{Multiply each side by 11.}$$



EXAMPLE 4 Using a Sine Ratio

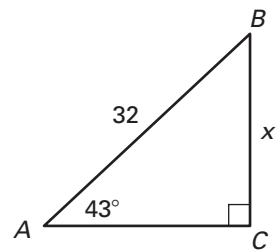
In $\triangle ABC$ shown, \overline{BC} is opposite $\angle A$. You know the length of the hypotenuse. To find the value of x , use $\sin A$.

$$\sin A^\circ = \frac{\text{opposite}}{\text{hypotenuse}} \quad \text{Definition of sine ratio}$$

$$\sin 43^\circ = \frac{x}{32} \quad \text{Substitute.}$$

$$0.6820 \approx \frac{x}{32} \quad \text{Use a calculator to approximate } \sin 43^\circ.$$

$$21.824 \approx x \quad \text{Multiply each side by 32.}$$



Exercises for Examples 3 and 4

Find the value of x to the nearest tenth.

